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The University of North Carolina

RECORD

School of Applied Sciences

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THE UNIVERSITY RECORD

Number 64 Fifty Cents a Year July, 1908

SCHOOL OF APPLIED SCIENCES

Courses Leading to the Degree of Bachelor of Science.

In order to be recommended for the degree of Bachelor of Science, the student must have passed satisfactory examinations in all the studies required in one of the four courses outlined in this department. Each course combines instruction in certain sciences and their application to the arts with certain other general studies deemed essential for a liberal education. These courses are designed to furnish the fundamental instruction and to prepare students to pursue the technical professions to which they lead. The courses are six in number:

I. Chemical Engineering.
II. Electrical Engineering.
III. Civil Engineering.
IV. Mining Engineering.
V. Soil Investigation.
VI. Road Engineering.

The Undergraduate Department comprises the College and the School of Applied Sciences. The courses of instruction outlined in the College lead to the degree of Bachelor of Arts; those in the School of Applied Sciences lead to the degree of Bachelor of Science.

ADMISSION

Admission into the Freshman Class

The requirements for admission into the Freshman class are the same for the College and the School of Applied Sciences. Candi-

dates are received by examination or by certificates from accredited schools.

Entrance examinations are held in September. Arrangements have been made with certain schools in the State whereby examinations for admission may be held in May, also, at the schools. The University will accept the uniform entrance examination papers of the Association of Colleges and Preparatory Schools of the Southern States, provided such papers are properly vouched for and sent sealed to the University for grading. Candidates for admission by examination must report at 9 A. M., *Monday; September 7, 1908*, to the Registrar, who will appoint time and place for examination.

Students who present certificates of work accomplished at preparatory schools and colleges may be admitted without examination, provided the certificates are approved. The right to examine, however, is reserved, when such a course is deemed necessary. Certificates must be made out on the printed forms furnished on application to the Registrar. They must be submitted for approval to the Committee on Entrance Certificates in No. 2 Alumni Building during the period of registration (*September 7, 8, 9, 1908.*)

Subjects Accepted for Entrance

The subjects accepted for entrance are arranged in two groups designated respectively *Required Subjects* and *Elective Subjects*. Every subject in both lists has a valuation by units as indicated below. All candidates for entrance must offer all the studies in the list of required subjects, making a total of 11 units, and, in addition, studies enough from the list of elective subjects to make a total of 4 units. Unconditioned entrance, therefore, to any one of the three courses leading to the bachelor's degree requires a total of 15 units.

Students entering Group 1 of Freshman year (see p. 30, University Catalogue) may offer any science or sciences of the valuation of 1 unit as the science in the required subjects. They must offer Greek *a* and *b* (2 units), and Latin *a*, *b*, *c*, and *d* (3.7 units), two units of which may be substituted for the foreign language in the required subjects.

Students entering Group 2 of Freshman year (see p. 30, University Catalogue) must offer Physics (1 unit) as the science in the required subjects; and also Latin *a*, *b*, *c*, *d* (3.7 units), and French *a* (2 units) or German *a* (2 units), two units of which may be substituted for the foreign language in the required subjects.

Students entering Group 3 of Freshman year (see p. 30, University Catalogue) must offer Physics (1 unit) as the science in the required subjects; and also French *a* (3 units) and German *a* (2 units), two units of which may be substituted for the foreign language in the required subjects.

The lists are as follows:

Required Subjects

English *a* and *b*	3. units	Solid Geometry (in 1909)	.5 unit
History	2. units	Science	1. unit
Algebra	1.5 units	*Foreign Language	1. unit
Plane Geometry	1. unit		

Elective Subjects

History, Mediaeval	1. unit
Trigonometry	.5 unit
Botany	1. unit
Chemistry	1. unit
Physics	1. unit
Physiography	.5 unit
Physiology	.5 unit
Zoology	1. unit
Civics	.5 unit
Drawing	1. unit
French, Elementary	2. units
Intermediate	1. unit
German, Elementary	2. units
Intermediate	1. unit
Greek, Grammar and Composition	1. unit
Xenophon	1. unit
Homer	1. unit

*By Foreign Language is meant any language except English.

Latin, Grammar and Composition..... 1. unit
Caesar..... 1. unit
Cicero..... .7 unit
Vergil..... 1. unit
Cornelius Nepos..... 1. unit
Spanish, Elementary..... 2. units

The requirements in each of the subjects accepted for entrance are as follows:

English: (*a*) Reading and Practice..... 1.5 units

Shakespere's The Merchant of Venice and Macbeth; The Sir Roger de Coverley Papers in the Spectator; Irving's Life of Goldsmith; Coleridge's Ancient Mariner; Scott's Ivanhoe and Lady of the Lake; Tennyson's Gareth and Lynette, Lancelot and Elaine, and The Passing of Arthur; Lowell's The Vision of Sir Launfal; George Eliot's Silas Marner.

The candidate is expected to have sufficient knowledge of these books to enable him to answer general questions on their substance. The form of the examination will be the composition of paragraphs on a number of topics connected with the works. The ability of the candidate to express his ideas in clear, accurate English is a main consideration. No applicant should present himself who is notably deficient in spelling, grammar, or paragraphing.

(*b*) Study and Practice..... 1.5 units

Shakespere's Julius Caesar; Milton's L'Allegro, Il Penseroso, Comus, and Lycidas; Burke's Speech on Conciliation with America; Macaulay's Essays on Addison and The Life of Johnson.

The questions on these books will be on subject matter and structure.

History: Either of the following courses:

(*a*) The histories of the United States, Greece, and Rome, as outlined in the best text books for high schools.....2. units

(*b*) The histories of the United States and England as outlined in the best text books for high schools... 2. units

(*c*) Mediaeval History ..... 1. unit

Mathematics: (*a*) Algebra .....1.5 units

The whole of a high school algebra including quadratic equations, binomial theorem, and progressions.

(*b*) The whole of Plane Geometry..... 1. unit

(*c*) The whole of Solid Geometry (in 1909)..... .5 unit

(*d*) Trigonometry..... .5 unit

Plane trigonometry and spherical trigonometry through right triangles.

Greek: (*a*) Grammar and Composition..... 1. unit

Acquaintance with the more usual forms and constructions; simple narrative in English, based upon Xenophon's Anabasis, to be translated into Greek.

(*b*) Xenophon..... .....1. unit

The first four books of the Anabasis.

(*c*) Homer.....1. unit

The first three books of the Iliad (omitting II. 494—end), with study of Homeric forms, constructions, and prosody.

Latin: (*a*) Grammar and Composition.....1. unit

Forms, syntax, and prosody; simple narrative in English, based upon the prose read, to be translated into Latin.

(*b*) Caesar..... 1. unit

The first four books of the Bellum Gallicum.

(*c*) Cicero..... ..... .7 unit

The four orations against Cataline.

(*d*) Vergil..... 1. unit

The first six books of the Aeneid, study of hexameter verse.

(*e*) Cornelius Nepos..... 1. unit

The first fifteen lives.

French: (*a*) Elementary..... 2. units

The forms and uses of the various parts of speech, including irregular verbs; translation of 250 or more pages of easy prose into idiomatic English; translation of simple English sentences into French; pronunciation.

(*b*) Intermediate..... 1. unit
Translation of 400 or more pages of French of ordinary difficulty.

German: (*a*) Elementary..... 2. units
Inflection, including the most common strong verbs; the ordinary laws of German syntax; translation of 200 or more pages of easy German into idiomatic English; translation of simple English sentences, based upon passages read, into German.

(*b*) Intermediate..... 1. unit
Translation of 400 or more pages of German of ordinary difficulty.

Spanish: (*a*) Elementary..... 2. units
Inflections, including the most common irregular verbs; ordinary laws of syntax; translation of 250 pages or more of easy Spanish into idiomatic English; translation of simple English sentences, based upon the passages read, into Spanish.

Botany:..... 1. unit
Anatomy, morphology; physiology; ecology; natural history of the plant groups, and classification; laboratory work.

Chemistry:..... 1. unit
A course such as is contained in any standard text book; laboratory work.

Physics:..... 1. unit
A course such as is contained in Milliken and Gale's Physics or Carhart and Chute's High School Physics; laboratory work such as is outlined in Milliken and Gale's Physics.

Physiography:..... .5 unit
A course such as is contained in any standard text book.

Physiology:..... .5 unit
A course such as is contained in any standard text book.

Zoology: ..... 1. unit

A year's course such as is contained in any standard text book.

Civics: ..... .5 unit

A course such as is contained in any standard text book.

Drawing: ..... 1. unit

A year's work, including simple geometrical plane and solid figures, simple pieces of machinery; elementary rules of perspective, light, and shade as applied in freehand sketching.

Admission to Advanced Standing

A candidate for advanced standing may be admitted to the Sophomore, Junior, or Senior Class, with or without complete examination. He is subject not only to the examinations required of candidates for admission into the Freshman Class, but to special examinations both in all the required studies already pursued by the class which he desires to enter, and in as many elective studies as would have been required of him as a member of that class. When satisfied with the apparent fitness of the candidate, the examining committee may, in spite of his deficiencies in some studies, admit him to an advanced class; but a candidate so admitted is not recommended for the degree until the deficiencies are made good. The examining committee may accept, also, with proper restrictions, the official report of work satisfactorily completed at a college or university of good standing in place of an examination upon such previous work.

A candidate for advanced standing should present himself for examination on the same days and at the same hours with candidates for admission into the Freshman Class.

OUTLINE OF COURSES

I Chemical Engineering

FRESHMAN YEAR

English 1 ..... (3)
Mathematics 1 ..... (4)
German 1 ..... (3)
Chemistry 1 ..... (3)
Drawing 1 ..... (2)

SOPHOMORE YEAR

English 2 ..... (3)
Mathematics 2 ..... (3)
Chemistry 3, Qualitative Analysis ..... (2)
Chemistry 4, Quantitative Analysis and Assaying ..... (3)
Physics 1 ..... (3)
Drawing 2A ..... (2)

JUNIOR YEAR

Chemistry 16, Inorganic Chemistry, advanced ..... ($1\frac{1}{2}$)
Chemistry 2, Technical Chemistry ..... (3)
Chemistry 17, Quantitative Analysis, advanced ..... (3)
Chemistry 5, Organic Chemistry, advanced ..... (3)
Chemistry 7, Elementary Physical Chemistry ..... (2)
Geology 1 ..... (3)
English 3A ..... ($1\frac{1}{2}$)

SENIOR YEAR

Chemistry 6, Theories of Chemistry ..... (2)
Chemistry 5A, Organic Chemistry ..... (2)
Select one { Chemistry 7A, Physical Chemistry, advanced ..... (3)
Select one { Chemistry 7B, Electro-Chemistry ..... (2)
Chemistry 8, Advanced Quantitative Analysis and Research ... (5)
Physics 4A, Electro-Magnetic Apparatus ..... (2)

Physics 6, Thermo-dynamics, (Fall term).....(1½)
Geology 2, Mineralogy..... (3)

II Electrical Engineering

FRESHMAN YEAR

English 1 ..... (3)
Mathematics 1..... (4)
Select one { German 1..... (3) / French 1..... (3)
Chemistry 1..... (3)
Drawing 1..... (2)

SOPHOMORE YEAR

English 2..... (3)
Mathematics 2..... (3)
Select one { German 1..... (3) / French 1..... (3)
Physics 1..... (3)
Physics 4, Electricity and Magnetism ..... (2)
Chemistry 3, Qualitative Analysis..... (2)

JUNIOR YEAR

Mathematics 3, Surveying..... (2)
Mathematics 3B..... (2)
Mathematics 4..... (3)
Physics 4A, Electro-Magnetic Apparatus..... (2)
Physics 6, Thermo-dynamics..... (3)
Physics 6A.....(1½)
English 3A.....(1½)
Drawing 2..... (2)

SENIOR CLASS

Physics 7, Alternating Currents..... (4)
Physics 8, Batteries..... (1)
Physics 9, Electric Wiring and Distribution..... (1)
Physics 10..... (3)
Chemistry 7B, Electro-Chemistry..... (2)

Select one { Chemistry 2, Technical Chemistry..... (3)
Chemistry 4, Quantitative Analysis..... (3)
Drawing 3..... (2)

III Civil Engineering

FRESHMAN YEAR

English 1..... (3)
Mathematics 1..... (4)
Select one { German 1..... (3)
French ..... (3)
Chemistry 1..... (3)
Drawing 1..... (2)

SOPHOMORE YEAR

English 2..... (3)
Mathematics 2..... (3)
Mathematics 3, Surveying..... (2)
Mathematics 3A..... (3)
Physics 1..... (3)
Drawing 2A..... (2)

JUNIOR YEAR

Mathematics 3B, Descriptive Geometry..... (2)
Mathematics 4, Calculus and Analytic Mechanics..... (3)
Mathematics 7, Railroad Surveying and Engineering..... (3)
Mathematics 12, Graphical Statics..... (1½)
English 3A..... (1½)
Geology 1..... (3)
Drawing 2..... (2)

SENIOR YEAR

Mathematics 7A, Hydraulics..... (3)
Mathematics 11, Arches, Dams and Sanitary Engineering..... (3)
Mathematics 8, Mechanics of Materials..... (3)
Mathematics 10, Bridges and Roof Trusses..... (4)
Chemistry 2, Technical Chemistry..... (3)

IV Mining Engineering

FRESHMAN YEAR

English 1 ..... (3)
Mathematics 1, Algebra, Geometry, Trigonometry ..... (4)
German 1 ..... (3)
Chemistry 1, General Chemistry ..... (3)
Drawing 1 ..... (2)

SOPHOMORE YEAR

English 2 ..... (3)
Mathematics 2 ..... (3)
Physics 1 ..... (3)
Geology 1 ..... (3)
Chemistry 3, Qualitative Analysis and Assaying ..... (2)
Drawing 2A ..... (2)

JUNIOR YEAR

Mathematics 3, Surveying and Levelling ..... (2)
Mathematics 4, Calculus and Analytic Mechanics ..... (3)
Physics 6, Thermo-dynamics and Steam Engine ..... (3)
Geology 2, Mineralogy ..... (3)
Chemistry 4, Quantitative Analysis ..... (3)
Geology 11, Ore Deposits ..... (1)
English 3A ..... ($1\frac{1}{2}$)

SENIOR YEAR

Chemistry 2, Technical Chemistry, Metallurgy ..... (3)
Geology 4, Economic Geology ..... (3)
Geology 6, Mine Examinations ..... (3)
Geology 12, Principles of Mining ..... (1)
Physics 4A, Electro-Magnetic Apparatus ..... (2)
Mathematics 7A, Hydraulics ..... (3)
Elective ..... (1)

V Soil Investigation

Prerequisites: English 1, Mathematics 1, Physics A, and two of the following: German A, French A, Spanish 1.

FIRST YEAR

English 2 ..... (3)
Chemistry 1 ..... (3)
Chemistry 3 ..... (2)
Physics 1 ..... (3)
Geology 1 ..... (3)
Soils 1 ..... (3)

SECOND YEAR

Zoology 1 ..... (3)
Botany 1 ..... (3)
Chemistry 4 ..... (3)
Geology 8 ..... (3)
Soils 2 ..... (2)
Mapping ..... (2)

VI Road Engineering

FIRST YEAR

English 1 (3)
Mathematics 1 (4)
Select one { German 1 (3) / French 1 (3)
Chemistry 1 ..... (3)
Drawing 1 ..... (2)

SECOND YEAR

English 2 ..... (3)
Mathematics 3, Surveying and Levelling ..... (2)
Physics 1 ..... (3)
Geology 1 ..... (3)
Mathematics 16, Road Construction and Drainage ..... (2)
Drawing 2A, Traverse and Topographic Mapping ..... (2)

THIRD YEAR

Mathematics 7, Location of Roads, Excavation ..... (3)
Geology 8, Study of Soils ..... (3)
Geology 4, Rocks for Road Construction ..... (1½)
English 3A ..... (1½)

Chemistry 2, Technical Chemistry..... (3)
Mathematics 10, Bridge Trusses..... (2)
State Roads and Road Management (Lectures)..... (1)
Building Object Lesson Roads (Field Work)..... (1)

Road Engineering

In this course on Road Engineering, the first year's work is the same as for the other courses of engineering in the School of Applied Sciences, including English I, Mathematics I, German or French I, Drawing I and Chemistry I.

In the second year the course as arranged begins to take up those subjects which are necessary to equip a student to become a competent road engineer. In this year the student will continue work in English and will take up Physics I, which is the general course in Physics; a general course of Geology I; Mathematics 3, which takes up Surveying and Levelling with actual field work with the instruments; Drawing 2A, which will familiarize the student with traverse and topographic maps and the method of drawing and lettering same; and a two hour course the full year on Road Construction and Drainage and Road Machinery. In this latter course the different classes of roads, as earth roads, telford, macadam, gravel roads and plank roads will be described and discussed, grading and location of roads, repair of roads, the subject of drainage and its relation to roads, the computing of the amount of water that will come from a certain drainage area and have to be taken care of by a culvert across the road; the different methods of drainage for sandy regions and clay regions and the use of covered drains, side ditches and culverts.

In the third year the student will take up Mathematics 7, which will be the actual location of roads, amount of excavation, grading, etc. In the fall term there will be the actual construction of an object lesson road, macadam and sand-clay. The study of soils will be taken up in the course of Geology 8. Rocks suitable for road construction and their wearing qualities will be studied in the spring term in the course of Geology 4. A special course will also be given in regard to bridge trusses and designs. A special course of lectures will also be given on State Roads and Road Management.

COURSES OF INSTRUCTION

Only those scientific courses which are specifically required in the School of Applied Sciences are given here.

Department of Mathematics

Professor Henderson and Associate Professor Stacy, and Messrs. Hickerson and Duls.

1. Algebra, from Quadratics to Determinants (Fisher and Schwatt's *Quadratics and Beyond*); Geometry, from Book IV. through Solid Geometry (Wells's *Essentials*); Plane Trigonometry and Logarithms (Ashton and Marsh's *Trigonometry*). *Both terms, four hours.*

Professor Cain.

2. Brief course in Conic Sections (Ashton's *Analytic Geometry*); Elementary Course in Differential and Integral Calculus (Cain's *Brief Course in the Calculus*). *Both terms, three hours.*

Associate Professor Stacy.

3. (*a*) Surveying (Raymond), and (*b*) Higher Surveying. *Both terms, three hours.*

3A. Higher Algebra, Elementary Mechanics. *Both terms, three hours.*

Mr. Mitchell.

3B. Graphics: Descriptive Geometry (Church); Shades, Shadows, and Perspective (Curtis). *Both terms, two hours.*

Professor Cain.

4. Calculus, Analytic Mechanics. Prerequisite, Mathematics 2. *Both terms, three hours.*

Associate Professor STACY.

7. Railroad Surveying and Railroad Engineering. Prerequisite, Mathematics 3. *Both terms, three hours.*

Professor HENDERSON.

7A. Hydraulics, Sanitary Engineering. Prerequisite, Mathematics 4. *Both terms, three hours.*

8. Mechanics of Materials. Prerequisite, Mathematics 4. *Both terms, three hours.*

10. Stresses in Bridges and Roof Trusses. Prerequisite, Mathematics 4. *Both terms, three hours.*

11. Mathematics. Arches, Dams and Sanitary Engineering. Prerequisite, Mathematics 12. *Both terms, three honrs.*

12. Graphical Statics. Prerequisite, Mathematics 4. *Spring term, three hours.*

16. Road Construction and Drainage. Road Machinery. *Both terms, two hours.*

Drawing

Mr. MITCHELL.

1. Freehand Drawing and Mechanical Drawing: (*a*) freehand: pencil outline, pencil shading from the flat models and casts; (*b*) mechanical: use of instruments; geometrical constructions; freehand lettering; dimensioning; (*c*) plotting. *Both terms, two hours.*

2. Mechanical and Topographical Drawing. (*a*) Orthographic projection; intersections: developments. (*b*) Machine drafting, conventional signs for materials of construction, sketching of machine details. (*c*) A course in tinting. (*d*) Topography: conventional signs; hill shading; mapping. *Both terms, two hours.*

Department of Physics

Professor PATTERSON.

1. General Physics; lectures, with text-book; problems; laboratory work. Prerequisite, Mathematics 1. *Both terms, three hours.*

4. General Study of Electricity and Magnetism, with laboratory work. *Both terms, two hours.*

4A. Electromagnetic Apparatus; direct current dynamos and motors; elementary study of alternating current machinery; testing and study of typical forms in the laboratory. Prerequisite, Physics 1 and 4. *Both terms, two hours.*

Professor LATTA.

6. Thermodynamics. This study is based on Edser's *Heat for Advanced Students*, Ewing's *The Steam Engine and Other Heat Engines*, and Peabody's *Thermodynamics of the Steam Engine*. prerequisite, Physics 1 and Mathematics 2. *Both terms, three hours.*

7. Alternating Currents and Alternating Current Machinery; lectures and problem work; testing and study of alternating current machines in the laboratory. Textbooks: Franklin and Williamson's *Alternating Currents and Alternating Currrent Machinery*, and Hay's *Alternating Currents*. Prerequisite, Physics 1 and 4A. *Both terms, four hours.*

8. Primary and Secondary Batteries; Electric Lighting. Prerequisite, Physics 1 and Chemistry 1. *Fall term, two hours.*

9. Electric Wiring and Distribution: a study of circuits for light and power. Prerequisite, fall term of Physics 7. *Spring term, three hours.*

10. Electric testing; experimental study of electromagnetic machinery and other apparatus; prerequisite, Physics 7. *Both terms, three hours.*

11. Steam Machinery. Introductory course; prerequisites, Mathematics 2 and Physics 1. *Spring term, three hours.*

Department of Chemistry

Professor HERTY and Dr. DAVIS.

1. General Descriptive Chemistry: a study of the elements and their compounds, including an introduction to Organic

Chemistry; lectures with laboratory work. *Both terms, three hours.*

Laboratory fee: Fall term, $1.00, Spring term, $1.50.

Professor HERTY.

2. Technical Chemistry. (*a*) Industrial and Agricultural Chemistry: glass-making, acids, alkalies, phosphates, fertilizers, foods, clothing, hygiene, etc. (*b*) Metallurgy; mining, treatment of ores, smelting, chlorination, fuel, building materials, etc. Prerequisite, Chemistry 1. *Both terms, three hours.*

Associate Professor WHEELER and Mr. JORDAN.

3. Qualitative Analysis; laboratory work with lectures. May be taken with Chemistry 1. *Both terms, two hours.*

Laboratory fee, $5.00 a term.

Associate Professor MILLS.

4. Quantitative Analysis and Assaying; laboratory work, lectures, and stoichiometric exercises; a grounding in analytical methods. Prerequisite, Chemistry 1 and 3. *Both terms, three hours.*

Laboratory fee, $5.00 a term.

Associate Professor WHEELER.

5. Organic Chemistry. Prerequisite, Chemistry 1 and 3. *Both terms, three hours.*

Laboratory fee, $4.00 a term.

5A. Organic Chemistry: special preparations. *Both terms, laboratory, two hours.*

Laboratory fee, $6.00 a term.

Professor HERTY.

6. The Theories of Chemistry. Prerequisite, Chemistry 1, 3, 4, 5. *Both terms, two hours.*

Associate Professor MILLS.

7. Elementary Physical Chemistry. Prerequisite, Chemistry 1 and 3. *Both terms, two hours.*

7A. Physical Chemistry; lectures and text-books, with laboratory work. Prerequisite, Chemistry 1 and 3. *Both terms, three hours.*

Laboratory fee, $2.00 a term.

7B. Electro-Chemistry; theory and application of electricity to chemical processes. Prerequisite, Chemistry 1 and 3. *Both terms, two hours.*

Professor Herty, Associate Professors Wheeler and Mills.

8. Research. Laboratory work. Thesis required embodying results of research. Prerequisites, Chemistry 1, 3, 4, 5, and 7. *Both terms, five hours.*

Laboratory fee, $10.00 a term.

Professor Herty.

16. Inorganic Chemistry. A detailed study of the reactions of the elements and their compounds. Lectures and text-book. Prerequisite, Chemistry 1. *Spring term, three hours.*

17. Quantitative Analysis. Laboratory work. Extension of course 4 in technical lines. Prerequisites, Chemistry 1, 3 and 4. *Both terms, three hours.*

Laboratory fee, $5.00 a term.

The Journal Club meets fortnightly. The current journals, American, English, German, and French, both the purely scientific and the technical, are reviewed by the students and instructors. Attendance is expected of students in all courses except 1 and 3.

Department of Geology and Mineralogy

Professor Cobb and Mr. Phillips.

1. Elementary Geology; lectures with field work; laboratory work on the common minerals and rocks. *Both terms, three hours.*

Mr. Eaton.

2. Mineralogy; lectures with laboratory and field work; Crosby's *Tables* and Dana's *Text-book of Mineralogy*. *Both terms, three hours.*

Professor Cobb.

3. General Critical Geology; lectures with field work; laboratory work on rocks and fossils; theses. *Both terms, three hours.*

Mr. Eaton.

4. Economic Geology: ore deposits and economic minerals; lectures with laboratory and field work. Prerequisite, Geology 1 or 3 and Chemistry 1 and 3. *Both terms, three hours.*

Professor Cobb.

6. Advanced field work and special research in Geology or Geography; problems and work adapted to the professional needs of the student. Prerequisite, Geology 2 and 3. *Both terms, three hours.*

Professor Pratt.

11. Mineral and Ore Deposits; lectures supplemented by laboratory and field work. *Twenty-four lectures* (*Spring term*).

12. Principles and Practice in General Mining; lectures supplemented by visits to different mining regions.

14. Advanced work in Mineralogy: Laboratory work; Investi- relating to the chemical composition, occurrences and uses of minerals.

The Geology Seminary meets fortnightly for review and discussion of current geological literature, and for the presentation of original papers.

Soil Investigation

Professor Cobb and Mr. Hearne.

1. Agricultural Soils: an elementary course covering the nature, origin, and classification of soils, based on G. P. Merrill's *Rocks, Rock Weathering and Soils*, F. H. King's *The Soil*, and reports and bulletins of the Bureau of Soils, U. S. Department of Agriculture; lectures, reading, and field and laboratory work. *Fall term, three hours.*

2. Soils of the United States: an introductory study of the chief soil provinces, soil series, and soil areas in the United States, with special reference to the soils of North Carolina. *Spring term, two hours.*

3. Soil mapping: preparation of large scale soil maps of the Chapel Hill region. Not counted for a degree.

4. Soil Seminary. Study of soil literature with preparation of reports on selected subjects. Open to students engaged in soil work. *One evening each week during February and March.*

English

Professor Smith, Messrs. Bryan, Grainger, and Hughes.

1. Types of Literature: the short story, the novel, the essay, and the oration; the lyric, the epic, the ballad, and the drama. This course lays the foundation for the student's later studies in both literature and composition. The aim of the course is to inspire an appreciation of good literature by an intensive study of interesting and representative types. Practice in composition will be based chiefly upon the texts read. *Both terms, three hours.*

Associate Professor Royster, Messrs. Bryan, Grainger, and Hughes.

2. History of English and American Literature. Reports on assigned readings. *Both terms, three hours.*

Professor Graham.

3A. Composition: a practical course in expository writing designed to teach clearness and good construction. Lectures and theses. *Fall term, three hours.*

French

Messrs. Parker and Vermont.

A. Elementary Course: grammar; pronunciation; written exercises; rapid reading of easy prose; reading at sight.

This course may be counted for entrance only. *Both terms, three hours.*

Professor Bruner.

1. Modern French Literature; rapid reading of representative novels, short-stories, and dramas; collateral reading. *Both terms, three hours.*

German

Professor Toy, Associate Professor Cobb, and Mr. Logan.

A. Elementary Course; grammar; written and oral exercises; translation; sight reading. This course may be counted for entrance only. *Both terms, three hours.*

Professor Toy and Associate Professor Cobb.

1. Translation, sight reading, composition, grammar. *Both terms, three hours.*

The Physical Laboratory

Andrew H. Patterson, A.M., Director and *Professor of Physics.*
James Edward Latta, A.M., *Professor of Electrical Engineering.*
Percy Hoke Royster, A.B., *Fellow in Physics.*
Thomas Joseph McManis, *Assistant in Physics.*
B. W. Jones, *Assistant in Physics.*

The Physical Laboratory occupies the eastern half of the main floor and almost the whole of the basement floor of the Alumni Building, amounting to about seven thousand square feet of floor space.

The main floor is divided into a lecture room, an apparatus room, laboratory for students in the general course, Physics 1, and a laboratory for X-ray and photometric work.

In the rooms of the basement are located the dynamos, motors, electrical laboratory, electric furnaces, storage battery, and the workshops for wood and metal.

A special appropriation granted by the Legislature in 1903 has made it possible to equip the Physical Laboratory with standard

types of electrical machines: dynamos, motors, transformers, meters, switchboard, storage battery, electric furnace, and the accessories needed for practical instruction in electrical engineering. The facilities for the general teaching of Physics experimentally have likewise been increased.

The electric light and central heating plants constitute valuable adjuncts to the laboratory.

Chemistry Hall

Charles Holmes Herty, Ph.D., Director and *Smith Professor of General and Agricultural Chemistry.*

Alvin Sawyer Wheeler, Ph.D., *Associate Professor of Organic Chemistry.*

James Edward Mills, Ph.D., *Associate Professor of Physical Chemistry.*

Royall Oscar Eugene Davis, Ph.D., *Instructor in Chemistry.*

L. G. Southard, A.B., *Fellow in Chemistry.*

E. J. Newell, *Fellow in Chemistry.*

Strowd Jordan, M.S., *Assistant in Chemistry.*

W. M. Oates, *Assistant in Chemistry.*

D. C. McRae, *Assistant in Chemistry.*

C. L. Bransford, *Assistant in Chemistry.*

The overcrowded condition of the laboratories and lecture room in Person Hall and the unsatisfactory ventilation of the laboratories made urgent the need for a larger and better arranged building for the Department of Chemistry. These facts, together with complete plans for a new building, were laid before the Legislature in 1905 and an appropriation of $50,000 asked. The appropriation was voted, and in a short while the work of construction was under way.

The new building, "Chemistry Hall," is located east of Alumni Hall and north of the New East Building, facing west. By the selection of this location good water pressure is assured for all of the laboratories in the building.

The outer walls are of salt and pepper pressed brick laid with black mortar.

The main building, 120x68x48, comprises a first floor, a second floor, and a commodious basement. Adjoining this main building and to the rear of the center is the lecture room, 41x62x22.

To the right on entering the main building are the office and the private laboratory of the Director, the department library, and a small lecture room; to the left are the office and private laboratory of the Associate Professor of Organic Chemistry, a large laboratory for organic Chemistry, containing locker desks for twenty-four students, and a combustion room.

On the rear or east side of the first floor are the laboratories for quantitative analysis (thirty-two desks), and adjacent fume room, advanced quantitative analysis (twenty-four desks), and technical chemistry (six desks). At each end of the corridor are balance rooms.

On the second floor are the laboratories for general chemistry (sixty-six desks), qualitative analysis (sixty desks), physical chemistry (eight desks), electro-chemistry (eight desks), a research laboratory (sixteen desks), a laboratory for physiological chemistry (forty-eight desks), a fume room, and a small lecture room. At the ends of the corridor on the second floor are a balance room, preparation room, and a dark room for spectroscopic work.

In the basement are the assay, metallurgical and mineralogical laboratories, rooms for gas machine, electric furnace, technical chemistry, constant temperature, a photographic dark room, a carpenter shop, store room for heavy chemicals, and a large stock room for chemicals and apparatus. From this stock room material is supplied to each floor of the building by an elevator.

Each laboratory is furnished with ample fume closets for the removal of noxious gases, while pivoted window sash insure proper ventilation of the rooms.

The entire building is heated by hot water from the central system of the University.

The main entrance hall leads direct to the lecture room, which is well lighted by high arched windows and has a seating capacity of two hundred, which can be increased somewhat as need requires. To the rear of the lecture room are a preparation room

and a museum for specimens of typical chemicals, minerals, and products illustrating the various phases of chemical industries. Above these two last rooms is a small room for filing charts, diagrams, etc., used in illustrating lectures.

The Geological Laboratory and Museum

Collier Cobb, A.M., Director and *Professor of Geology and Mineralogy.*

Joseph Hyde Pratt, Ph.D., *State Geologist and Professor of Economic Geology.*

Harry Nelson Eaton, A.M., *Instructor in Geology.*

D. M. Phillips, B.S., *Assistant in Geology.*

The Geological Laboratory occupies the first floor of the New East Building. In addition to a lecture room with a seating capacity of about ninety, there is a large laboratory supplied with working collections of minerals, rocks, and fossils, and with photographs, maps, and models illustrating geological structure. The laboratory is furnished with two petrographical microscopes, with microscopes for soil study, and with apparatus for the slicing and polishing of rocks. Microscopic slides have been made of most of the specimens from North Carolina; and the department has, also, sections of the typical European rocks. Sections of the rocks around Chapel Hill, and the igneous rocks of the Boston Basin, made by the late Hunter Lee Harris, of the class of 1889, were given to the geological department. There is a room for photographic work.

The University possesses a collection of more than two thousand specimens of building stones, coals, and various products illustrating the economic geology of the State. These are arranged in an exhibition room of six hundred and fifty square feet of floor space. Here are kept also the sections taken with a diamond drill in the coal regions of Pennsylvania, in the region around King's Mountain, where the Summer School of Geology held its sessions, in the Dan river coal fields, and in the Triassic Rocks at Durham, N. C. A complete set of the ores of the precious metals found along the line of the Atchison, Topeka, and Santa Fé Railroad is included in the collection. Valuable additions have

been made to the collections of fossils also, affording increased opportunity for laboratory work in historical geology and palaeontology. A small collection of tertiary type fossils from Florida, the gift of Mr. Joseph Wilcox of Philadelphia, is the most recent addition to the palaeontological collection. The collection illustrating economic geology has been largely increased.

The department library, which occupies a room adjoining the exhibition room, is supplied with State and United States Reports, the papers of working geologists, the best works upon Geology, and scientific periodicals.

The Elisha Mitchell Scientific Society

William Chambers Coker, Ph.D., *President.*
James Edward Latta, A.M., *Vice-President.*
Francis Preston Venable, Ph.D., D.Sc., LL.D., *Permanent Secretary and Treasurer.*
Alvin Sawyer Wheeler, Ph.D., *Recording Secretary.*

The Elisha Mitchell Scientific Society holds monthly meetings during the college year for the discussion of scientific subjects. A Journal which is the official organ of the North Carolina Academy of Science, is issued quarterly. The object of the Society is to encourage scientific research and to record such matters as pertain to the natural history of the State. The membership is at present restricted to the Faculty and students of the University, and members of the staff of the Geological Survey.

At the monthly meetings, which are ordinarily held on the second Tuesday of each month, excellent opportunities are afforded the students to get beyond the ordinary routine of the class room by hearing, reading, and discussing papers on scientific subjects.

The Journal is in a measure a bulletin of the scientific laboratories of the University and contains many articles written by research students. It is now in the twenty-third year. The volumes already issued contain twenty-three hundred pages. By the exchange of the Journal with more than three hundred scientific journals and periodicals, over ten thousand books and pamphlets have been collected, all of which are arranged in the University Library.

POSITIONS HELD BY GRADUATES

1876. Wm. B. Phillips, Ph. D. Assistant State Chemist; Chemist Navassa Guano Co.; Professor of Metallurgy University of N. C.; Professor of Chemistry University of Ala.; Chemist Tennessee Coal & Iron Co., Birmingham, Ala.; Associate editor Engineering Journal, N. Y.; Editor American Manufacturer, Pittsburg, Pa.; Profes- of Economic Geology, University of Texas; Mining Expert, Birmingham, Ala.

1881. *Thomas Radcliffe. Acme Fertilizer Co., Wilmington, N. C.

J. F. Wilkes. Mecklenburg Iron Works, Charlotte, N. C.

F. B. Dancy. Assistant State Chemist; Managing Director Old Fertilizer Co., Norfolk, Va.; Division Superintendent Virginia-Carolina Chemical Co., Atlanta, Ga.

H. B. Battle, Ph. D. Assistant State Chemist; Director N. C. Experiment Station; Virginia-Carolina Chemical Co.; Commercial Laboratory, Montgomery, Ala.

1883. H. E. Thompson, Professor of Physics, State Normal College, Denton, Texas.

1884. J. C. Roberts. Professor of Metallurgy, Colorado School of Mines; Superintendent of Mine, Cripple Creek; Reduction Works, Niagara Falls, N. Y. U. S. Geological Survey, Washington, D. C.

*E. A. de Schweinitz, Ph.D. Chief of Division of Bio-Chemistry, U. S. Department of Agriculture; Professor of Chemistry and Dean of the Medical School, Columbian University, Washington. D. C.

James Lee Love. Assistant Professor of Mathematics, University of N. C.; Assistant Professor of Mathematics, Harvard University, and Secretary of the Lawrence Scientific School.

1885. W. C. Riddick. Professor of Civil Engineering and Mathematics, North Carolina College of Agriculture and Mechanic Arts.

1886. I. H. Manning. Chemist Navassa Fertilizer Co., Wilmington, N. C.; Chemist Chesapeake Fertilizer Co., Baltimore, Md.; Assistant Surgeon Atlantic Coast Line Railroad; Professor of Physiology, University of North Carolina; Dean of Medical Department.

1888. *Benoni Thorp. Assistant State Chemist, Raleigh, N. C.

1889. *H. L. Harris. Assistant, N. C. Geological Survey.

1890. W. M. Allen. Assistant State Chemist, Georgia; Assistant State Chemist, Raleigh, N. C.

*H. L. Miller. Assistant in Chemistry, N. C. Agricultural and Mechanical College; Chemist Navassa Fertilizer Co., Wilmington, N. C.; Division Superintendent Virginia-Carolina Chemical Co.

1891. J. M. Morehead. Electrical Engineer, Chicago.

A. H. Patterson. Professor of Physics and Astronomy, University of Georgia; Professor of Physics, University of N. C.

H. B. Shaw. Instructor in Mathematics, University of North Carolina; Assistant in Electrical Engineering, Lawrence Scientific School, Harvard University; Professor of Electrical Engineering, University of Missouri; Dean of Department of Engineering.

W. L. Spoon. Civil Engineer; Road Engineer, U. S. Department of Agriculture, and N. C. Geological Survey.

1892. J. V. Lewis. Professor of Geology, Clemson College, S. C.; Professor of Geology, Rutgers College, New Jersey.

1893. DeB. Whitaker. Chemist, Spanish-American Iron Co., Santiago, Cuba.

Charles Baskerville, Ph.D. Professor of Chemistry, University of N. C.; Professor of Chemistry, College of the City of New York.

R. H. Mitchell. Professor of Chemistry, Santa Rosa College, Santa Rosa, Cal.

1894. J. R. Harris. Assistant State Chemist, Raleigh, N. C.; Chief Chemist, Tennessee Coal and Iron Co., Birmingham, Ala.

Chas. H. White. Instructor in Mining and Metallurgy, Harvard University.

1895. W. R. Kenan, Jr. Superintendent Carbide Works, Niagara Falls; General Manager Traders' Paper Co., Electrical Engineer, Lockport, N. Y.

Edward W. Myers. U. S. Geological Survey; Consulting civil and hydraulic Engineer, Greensboro, N. C.

1896. Thomas Clark, Ph.D. Assistant Chemist. U. S. Department of Agriculture; Chemist Tennessee Coal and Iron Co., Birmingham, Ala.

F. F. Bahnson. Electrical Engineer, Palm Beach, Fla., Winston-Salem, N. C.

Robert E. Coker. N. C. Geological Survey; Chief of Fish Commission, Peru, South America.

E. P. Carr. Bureau of Soils, U. S. Department of Agriculture.

1897. S. H. Harris. Chemist, Nicaragua Canal Commission, Greytown, Nicaragua.

A. F. Moses. Chemist, Southern Chemical Co., Winston, N. C.

*B. W. Weston. Superintendent Gold Mine, near Hickory, N. C.

A. W. Mangum, Bureau of Soils, United States Department of Agriculture.

1898. A. W. Belden. Chemist, Tennessee Coal and Iron Co., Birmingham, Ala.; U. S. Geological Survey, Washington, D. C.

W. G. Haywood. Assistant State Chemist, Raleigh, N. C.

1899. F. W. Miller. Chemist, Northern Alabama Coal, Iron & Railway Co., Talladega, Ala.; Chemist, Birmingham Testing Laboratory, Assistant Superintendent Solvay Process Co., Ensley, Ala.

James E. Latta. Associate Professor of Physics, University of North Carolina; Professor of Electrical Engineering, University of North Carolina.

T. Gilbert Pearson. Professor of Geology and Biology, North Carolina Normal and Industrial College; Secretary Audubon Society.

R. G. S. Davis. U. S. Geological Survey.

J. P. Bunn. Superintendent Gold Mine, Edgecombe Co., N. C.

1900. J. J. Asbury. Tennessee Coal and Iron Co., Birmingham, Ala.

F. G. Kelly. Assistant Chief Chemist, Tennessee Coal and Iron Co., Birmingham, Ala.

Isaac F. Harris. Research Assistant, Connecticut Experiment Station, New Haven, Conn.; Lederle Anti-toxine Laboratory, N. Y. City.

D. M. Swink. Electrical Engineer, Durham Traction Co., Durham, N. C.

N. C. Curtis. U. S. Geological Survey; Instuctor in Drawing, University of North Carolina; Professor of Architecture, Alabama Polytechnic Institute, Auburn, Ala.

George N. Coffey. Bureau of Soils, U. S. Department of Agriculture.

T. D. Rice. Bureau of Soils, U. S. Department of Agriculture.

Frank Bennett. Bureau of Soils, U. S. Department of Agriculture.

W. E. Hearn. Bureau of Soils, U. S. Department of Agriculture.

L. V. Branch. U. S. Geological Survey.

1901. B. G. Klugh. U. S. Steel Corporation, Eveleth, Minn.

J. E. Mills, Ph.D. Instructor in Physical Chemistry, University of N. C.; Manager Standard Turpentine Co., Camden, S. C.; Associate Professor of Chemistry, University of North Carolina.

R. O. E. Davis, Ph.D. Instructor in Chemistry, University of N. C.

A. W. Harden. Electrician, Talladega, Ala.

Aldert S. Root. Bureau of Soils, U. S. Department of Agriculture.

1902. F. H. Lemly. Bio-chemical laboratory, U. S. Department of Agriculture.

Warren L. Kluttz. Tennessee Coal and Iron Co., Ensley, Ala.

J. W. Turrentine. Instructor in Chemistry, Lafayette College, Easton, Pa.; Instructor in Chemistry, Cornell University.

Willis O. Heard. Central Laboratory, Chester, Pa.

D. Z. Cauble. Tennessee Coal and Iron Co., Bessemer City, Ala.

E. G. Moss. Chemist, Cumberland Furnace, Tenn.

W. S. Prior, Jr. Tennessee Coal and Iron Co., Ensley, Ala.

M. H. Stacy. Instructor in Mathematics, University of North Carolina; Associate Professor of Engineering.

John S. Henderson, Jr. Electrical Engineer with Westinghouse Co., Pittsburg, Pa.; Supt. Roanoke Power Co.

B. S. Drane. U. S. Geological Survey.

T. C. Oliver. U. S. Geological Survey.

J. L. Burgess. Bureau of Soils, U. S. Department of Agriculture.

J. J. Skinner. Bureau of Soils, U. S. Department of Agriculture.

1903. H. H. Bennett. Chemical Department, Soil Survey, U.S. Department of Agriculture.

Thos. B. Foust. Bon Air Coal and Iron Co., Allen's Creek, Tenn.

H. R. Weller. Garrett Wine Company, St. Louis, Mo.

Hazel Holland. Assistant Chemist, Welsbach Lighting Co., Gloucester City, N. J.

Reston Stevenson. Assistant in Chemistry, Cornell University.

J. B. Thorpe, Clairton Steel Co., Clairton, Pa.

Geo. F. Catlett. Assistant State Chemist, Raleigh, N. C.

R. A. Lichtenthaler. Instructor in Chemistry, University of Florida; U. S. Forest Service, Washington, D. C.

F. L. Foust. U. S. Geological Survey.

Burges Urquhart. U. S. Geological Survey.

E. R. Wainwright. Canada Geological Survey.

Harllee McCall. Instructor in Mathematics, North Carolina College of Agriculture and Mechanic Arts.

1904. L. B. Lockhart. Instructor in Chemistry, Pensacola Academy, Fla.

John H. Pearson. General Electric Co., Schenectady, N. Y.

N. R. Graham. Assistant in Chemistry, College of the City of New York.

S. S. Heide. Chemist, Bon Air Coal and Iron Co., Allen's Creek, Tenn.

Preston Irwin. Chemist, Toch Bros., Paint Manufacturers, N. Y.

W. McK. Marriott. Assistant in Chemistry, Cornell Medical School, N. Y.

1905. E. E. Randolph. Carnegie Assistant in Chemistry, College of the City of New York; Professor, Rutherford College.

Strowd Jordan. Carnegie Assistant in Chemistry, College of the City of N. Y.; Assistant University of N. C.

Rex W. Perry. Assistant Chemist, Cotton Oil Works, Memphis.

Wade H. Oldham. Assistant Superintendent, Tennessee Coal and Iron Co., Ensley, Ala.

Ernest Sifford. Assistant Chemist Tennessee Coal and Iron Co., Ensley, Ala.; Birmingham Testing Laboratory, Birmingham, Ala.

R. G. Lassiter. General Manager Pontiac Mining Co., Va.

George M. MacNider. Soil Work with North Carolina Department of Agriculture.

Hamilton M. Jones. Westinghouse Co.; Pittsburg, Pa.

Geo. L. Paddison. Assistant in Chemistry, Kentucky State College; Instructor in Chemistry, University of Mississippi.

1906. A. H. Hoyle. Chemist, Tennessee Coal and Iron Co., Ensley, Ala.

R. Henry. Chemist, Virginia-Carolina Chemical Co., Richmond, Va.

C. L. Miller. Chemist, Sheffield Coal & Iron Co., Sheffield, Ala.

G. A. Johnston. Assistant in Chemistry, University of Cincinnnati; Chemist U. S. Steel Corporation, Youngstown, O.; Chemist Guantanamo Sugar Co., Cuba.

C. H. Sloan. Chemist Republic Iron and Steel Co., Thomas, Ala.

J. J. Tyson. Chemist, Tennessee Coal and Iron Co., Ensley, Ala.

A. W. Latta. General Electric Co., Charlotte, N. C.

F. M. Weller. General Electric Co., Schenectady, N. Y.

1907. Miss Daisy Allen. Chemist N. C. State Board of Health, Raleigh, N. C.

L. L. Brinkley. Assistant State Chemist, Raleigh, N. C.

R. P. Bunn. Bon Air Coal and Iron Co., Allen's Creek, Tenn.

Hampden Hill. Assistant State Chemist, Raleigh, N. C.

W. A. Houck. Chemist, Solvay Co., Ensley, Ala.

R. T. Allen. Assistant N. C. Geological Survey, Chapel Hill, N. C.

F. P. Drane. Chemist, Virginia-Carolina Chemical Co., Richmond, Va.

J. E. Pogue, Jr. Assistant in Mineralogy, Yale University.

C. L. Bransford. Chemist, Tennessee Coal and Iron Co., Ensley, Ala.

W. S. Hunter. Chemist, Tennessee Coal and Iron Co., Ensley, Ala.

J. C. Hines. Assistant in Physics, Wofford College, S. C.

R. H. McLain. General Electric Co., Schenectady, N. Y.

C. H. Keel. General Electric Co., Pittsfield, Mass.

C. A. Shore. Superintendent Public Health Laboratory, Raleigh, N. C.

Hubert Hill. Instructor in Chemistry, A. & M. College, Raleigh, N. C.

G. F. Leonard. Assistant Public Health and Marine Hospital Service, Washington, D. C.

1908. E. J. Newell. Sutherland Fellow in Chemistry, University of N. C.

L. G. Southard. Toch Fellow in Chemistry, University of N. C.

Drury McN. Phillips. Assistant in Geology, University of N. C.